

Corrosion on Hastelloy X Caused by CaCl_2

Obie Gillispie
Wolfgang Dworzak
Leonardo Trujillo

Composition of Hastelloy X

- Ni 47 wt-%
- Cr 22 wt-%
- Fe 18 wt-%
- Mo 9 wt-%
- Co 1.5 wt-%
- W 0.6 wt-%
- C 0.1 wt-%
- Mn 1 wt-%*
- Si 1 wt-%*

Composition of Inconel

- Ni 76 %
- Cr 17 %
- Fe 7 %

Effect of Nickel Chloride on Stainless Steel

- Nickel Chloride is rated to have a moderate effect on 316 stainless steel within 48 hours

Properties of Nickel Chloride

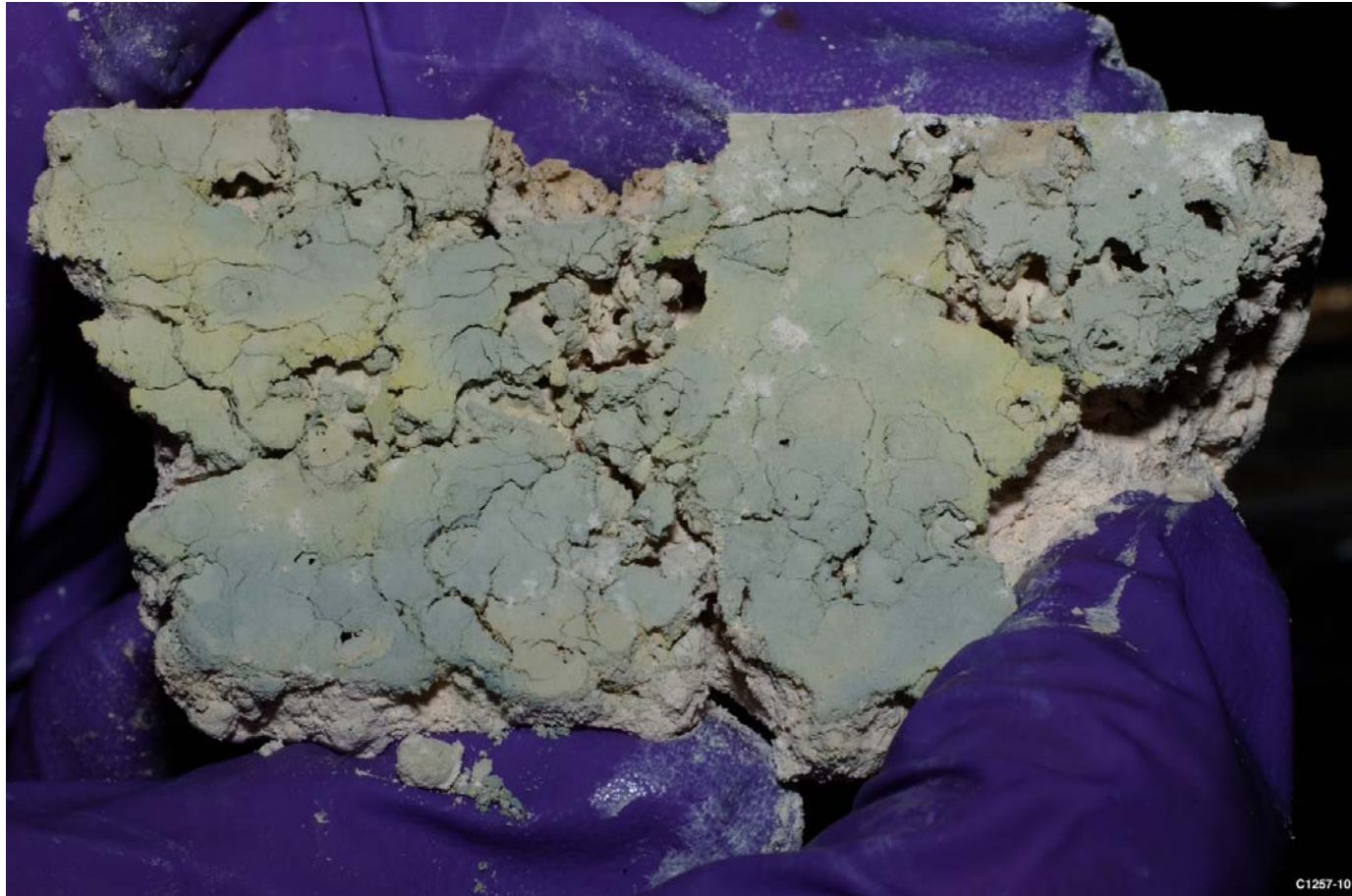
■ NiCl_2

- ☐ Yellow Hexagonal Crystal
- ☐ Hygroscopic
- ☐ Sublimation Point 985°C
- ☐ Triple Point 1009°C

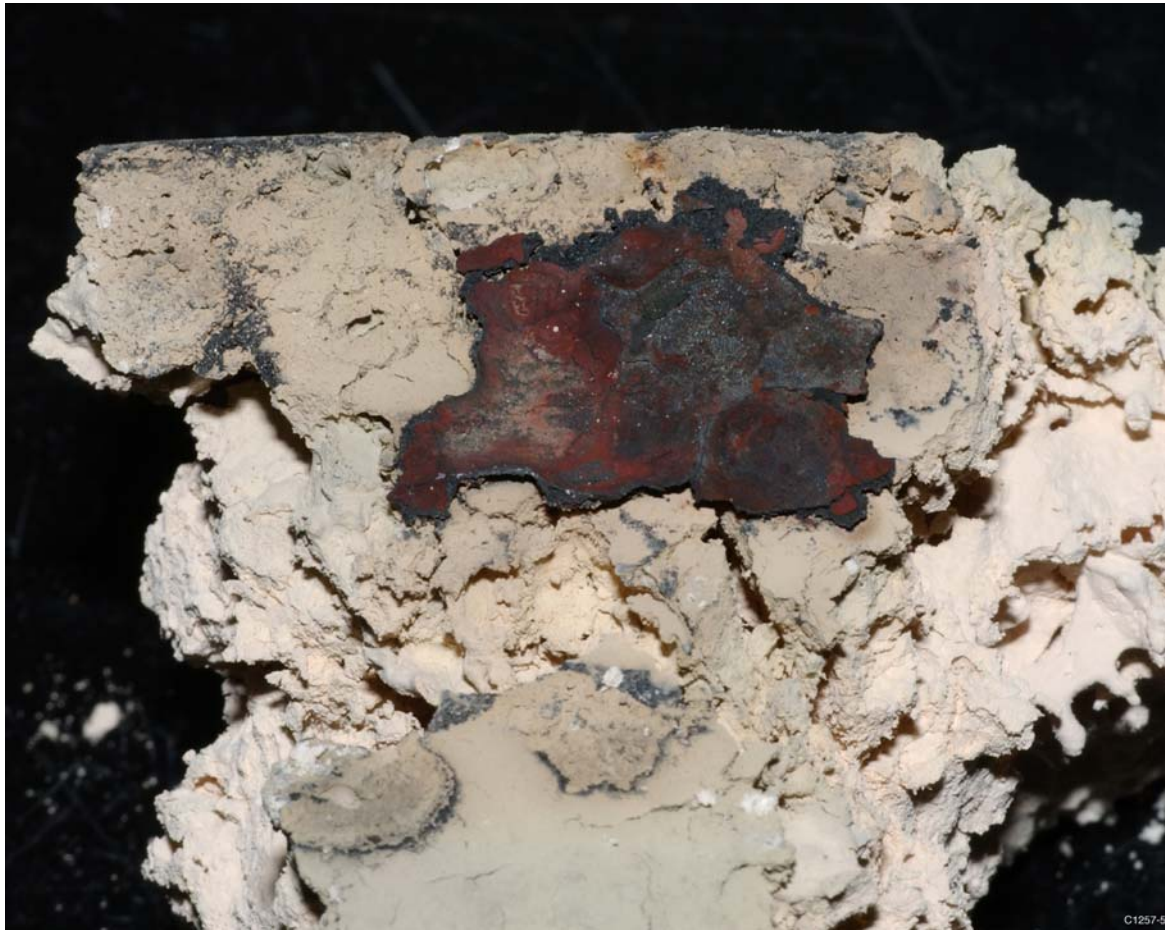
■ $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$

- ☐ Green Monoclinic Crystal

Nickel Chloride



Piece of Boat on Material



Corrosion After 1st Run with CaCl_2



Corrosion After 2nd Run with CaCl_2

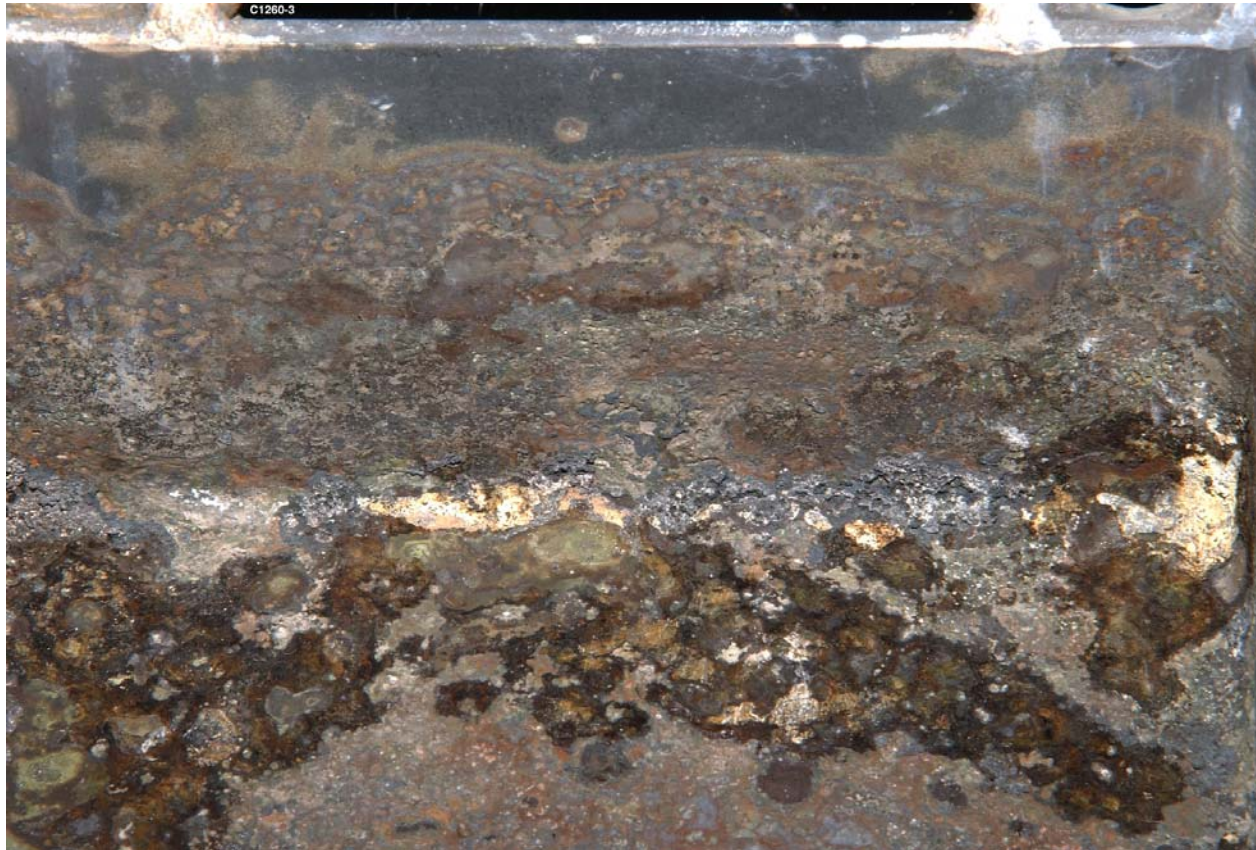


C1260-1

Corrosion After 2nd Run with CaCl_2



Corrosion After 2nd Run with CaCl_2



Boat Contents After 1st Run



C1257-14

Conclusions

- Nickel Chloride formed during calcination could cause corrosion in the 3013 can.
- Nickel Chloride is hygroscopic and can lead to additional moisture adsorption after calcination.
- Inconel has a higher nickel content than hastelloy and may experience more severe corrosion.
- Corrosion on the outside of the boat could increase the rate at which a boat would fail.